Sanset Area 2
Sanset, IL

SOLUTIA
Solutions for a better life.

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December 11, 2003

Mr. Ken Bardo
RCRA Division
U. S. Environmental Protection Agency, Region 5
77 West Jackson Blvd.
Chicago, IL 60604

Re: Results of Indoor Air and Soil Vapor Sampling and Analyses
Solutia W. G. Krummrich Plant
Sauget, Illinois

Dear Mr. Bardo:

Attached are three copies of a report containing the results of the two rounds of air quality sampling that were carried out at the Solutia W. G. Krummrich Plant in March/April and in August of 2003. The sampling and analyses were performed in accordance with a Work Plan that was submitted to you on December 12, 2002 and amended on February 25, 2003 and March 28, 2003, following a site visit by you.

Also attached to this letter are responses to comments provided by you on Solutia's report on the results of the first round of air sampling ("Results of RCRA CA-725 Environmental Indicators Air Quality Sampling", dated August 5, 2003). These comments were sent to us on October 3, 2003. For ease of reference, each of the comments is listed in italicized text and is immediately followed by our response. Where appropriate, the text of the attached report has also been directed at addressing the specific comments.

The results of the sampling program indicate that that indoor air in all of the buildings sampled does not contain any chemical constituents at concentrations which exceed the Permissible Exposure Limits (PELs) defined by the Occupational Safety and Health Administration (OSHA). The indoor air samples in three of the buildings contained one compound each (not the same in all cases) that was present at a concentration in excess of the screening values defined in a recently released EPA guidance document on vapor intrusion into indoor air. However, the results clearly demonstrate that the soil vapor under and around these buildings is not the source of these compounds.

If you have any questions about the attached material, please call me.

Sincerely,
Solutia Inc.

Gary W. Vandiver per Richard Williams

Gary W. Vandiver
Project Coordinator

cc: Nabil Fayoumi, USEPA
Jim Moore, IEPA
Gina Search, IEPA
Sandra Bron, IEPA
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Richard Williams, Solutia
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Responses to EPA Comments on Solutia's "Results of RCRA CA-725 Environmental Indicators Air Quality Sampling" Report Dated August 5, 2003

GENERAL COMMENTS

The last paragraph on page 2-1 of the December 12, 2002, Air Quality Field Sampling Plan indicates that the soil vapor samples will be gathered at locations consistent with the simultaneous soil sampling conducted by URS in areas where the existing groundwater data show high concentrations of VOCs. Figure 1 in Attachment B shows locations of TRC Soil Gas and Soil Sampling Locations. However, there is no discussion of the data obtained from the soil sampling locations contained in the report. These data would be meaningful in the correlation of the soil gas concentrations with actual soil sample concentrations. Please provide these data and a discussion of the results.

Response: TRC collected soil samples from the depth of the vapor probes at four locations during the March 2003 vapor point installation: SVP-2, SVP-6, SVP-11, and SVP-13. The samples were collected to provide some site-specific input should the soil vapor analytical results indicate the need to numerically simulate the potential for vapor intrusion using the Johnson and Ettinger model. The samples were collected using direct-push methods that permitted the collection of disturbed samples for laboratory analysis for total organic carbon and moisture content. Soil type was logged in the field. Since the indoor air quality measurements demonstrated that modeling would not be necessary, those samples were not analyzed.

URS collected soil samples in 2003 (see Table 5 of "CA 725 Current Human Exposures Under Control"). The samples collected near the four buildings did not contain any of the compounds found in the indoor air samples in the buildings in excess of the screening concentrations. Additional data from the soil sampling conducted by URS were provided to EPA at a meeting on August 18, 2003.

In EPA's review of the February 4, 2003, Air Quality Field Sampling Plan, there was a recommendation that Solutia submit the Tier 1, Tier 2, and, if necessary, Tier 3 screening checklists from EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (November 29, 2002) upon completion of the soil vapor sampling activities.

In addition, the recommendation indicated that Tier 2 of the approach outlined in EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (November 29, 2002) incorporates the Johnson and Ettinger (J&E) model for evaluating subsurface vapor intrusion. Given that soil samples and soil borings were proposed as part of the soil FSP, Solutia should have considered collecting site-specific soil parameters, such as soil porosity, soil moisture content, soil fraction of organic carbon, soil dry bulk density, and soil type, which are input parameters for the J&E model. As discussed above, there is no discussion of the soil sampling that was

conducted at the same time as the soil vapor sampling. If collected, please provide this information and any checklists that may have been completed.

Response: There are definitive data from the indoor environments of the only four on-site buildings that might be subject to vapor intrusion that show that constituents found in the indoor air samples appear to come from ambient air or from sources within the buildings themselves. Further, the concentrations of these constituents are well below the relevant level of concern (OSHA PELs). Consequently, screening is not necessary since actual data demonstrate that no unacceptable risk exists in any of the buildings. Similarly, application of the Johnson and Ettinger model to simulate vapor intrusion into the buildings is not necessary since the data demonstrate that this is an incomplete pathway.

SPECIFIC COMMENTS

1. Section 2.0, Indoor Air Quality Sampling, Page 2-1

The February 25, 2003, Air Sampling and Analysis Plan indicated that two rounds of indoor air sampling would occur. However, only one round of indoor air sampling occurred. The need for second round sampling was discussed at the August 12, 2003 meeting. In addition, the comments on the February 25, 2003, Air Sampling and Analysis Plan recommended that multiple samples at each location within a building occur. The need for multiple samples at each location and for multiple sampling rounds was also discussed with Solutia in a teleconference on March 13, 2003 and in a site visit on March 19, 2003. The reason multiple samples at each sampling location are needed is due to the variability in concentration gradients depending on layout, air flow patterns, and occupancy. The report did indicate that sampling was done during the weekend to minimize the variability caused by occupants during a normal work day. Multiple sampling rounds are needed to determine the impact of seasonal variability in factors such as temperature, heating, can cooling of indoor air, and fluctuations in groundwater flow, rainfall, and groundwater recharge. Provide a discussion regarding the second round of indoor sampling performed. Also, provide a discussion regarding why multiple samples were not collected from each sampling location.

Response: Indoor air sampling occurred in spring (March 29, 2003) and summer (September 6, 2003). No clear correlation between concentrations and temperature emerged from these data. Some compounds tended to have slightly higher concentrations in the summer sampling event (e.g., acetone, benzene, chlorobenzene, 1,1,1-trichlorobenzene), while other compounds, some with higher vapor pressures (e.g., MEK, MIBK and methylene chloride), displayed higher concentrations in winter than in summer. Ambient air concentrations were generally higher in summer than in winter, as would be expected. For the most part, soil vapor concentrations were higher in summer than in winter, but these comparisons are only possible at locations away from the buildings.

Because 8-hour average samples were collected at EPA's request, multiple indoor

samples were not necessary. Variability in concentrations depending on layout, airflow patterns, and occupancy are accounted for in the long averaging times.

2. Section 2.0, Indoor Air Quality Sampling, Page 2-2

In Table 2-1, the OSHA PEL for MIBK is 100,000, not 200,000 ppbv

Response: The OSHA PEL for MEK has been corrected in the tables of the report.

3. Section 2.0, Indoor Air Quality Sampling, Page 2-3

The discussion of the sampling results for the Building BBZ-Storeroom indicates that 4-methyl-2- pentanone (methyl isobutyl ketone or MIBK) was detected in concentrations above the target indoor air concentration listed in the Subsurface Vapor Intrusion Guidance. In the next paragraph, MIBK was also detected in soil vapor samples that were taken immediately adjacent to the BBZ building (SVP-16) and 1,000 feet north of the BBZ building (SVP-14). The third paragraph states that, "thus, it can be concluded that the MIBK, found in Building BBZ offices, most likely came from the ambient (outdoor) air or internally in the warehouse."

This third paragraph contradicts the findings stated in the first two paragraphs. Based on the soil vapor results, it appears that MIBK may be present in the soil vapor and/or groundwater and may be contributing to the indoor air concentrations. Please revise the third paragraph to acknowledge that there may be a potential contribution of MIBK from soil vapor and/or groundwater to the indoor air.

Response: The report has been revised. The warehouse portion of the BBZ building did contain MIBK in both winter and summer. The concentrations of MIBK in the offices are a reflection of the MIBK in the general warehouse air. The soil vapor sample at SVP-14 (actually 700 feet north of the north edge of the BBZ building) did identify a small concentration of MIBK in the soil vapors. MIBK was found in five other soil vapor samples (SVP-7A, SVP-15, SVP-16 and SVP-17 [summer]). Only one of these samples, SVP-7A next to the CCB building, contained MIBK at a concentration in excess of the target soil vapor concentration. No MIBK was detected in this building. Further, it is difficult to correlate the concentration of MIBK in SVP-16 next to the BBZ (3.9 ppbv, or 2% of the target concentration) with the 160 ppbv detected in the warehouse. Finally, MIBK was not detected in the nearest three shallow ground water samples. Consequently, it is concluded that the MIBK in BBZ does not come from the ground water and thus, the pathway is incomplete.

Section 2 has been revised to delete direct comparisons to soil vapor sampling and those results have been moved to Section 4.2. Discussion about MIBK in the BBZ building and its adjacent soil vapor sample has been added.

4. Section 2.1, Summary of the Indoor Air Sampling Results, Page 2-6

Clarify the ambient air sampling program as discussed at the August 18, 2003 meeting. The text on page 2-5 states that there were four ambient air sample locations taken near SVP-9, SVP-17, SVP-1, and SVP-21. For the four sample dates in Table 2-2, provided the sample location(s) and rationale for sampling at that location(s).

Response: Section 2.1 has been revised to identify the locations and the rationale for the ambient air sampling. The locations shown are coincident with the location of the soil vapor sample taken at that same location on that same day. The rationale for selecting these locations was to obtain measurements that would permit evaluation of ambient air concentrations at the soil vapor sampling sites.

5. Section 2.1, Summary of the Indoor Air Sampling Results, Page 2-7

In the first paragraph, the last sentence states, "the source of the ambient air concentrations does not appear to be soil vapor in the areas near the Building BBZ." As discussed in Comment No. 3, based on the detection of MIBK from a soil vapor probe adjacent to the building (SVP-16), it appears that MIBK may be present in the soil vapor and/or groundwater and may be contributing to the indoor air concentrations. Please revise this paragraph to acknowledge that there may be a potential contribution of MIBK from soil vapor and/or groundwater to the indoor air.

Response: Refer to the response to Comment 3.

6. Section 3.1, In Plant Soil Vapor Sampling, Page 3-1

The first paragraph in Section 3.1 indicates that due to high water in two locations, soil vapor samples SVP-7 and SVP-13 could not be collected. In Solutia's transmittal letter, the second round of air quality sampling will be limited to soil vapor only. This is important since a soil vapor sample (SVP-7) was not collected immediately adjacent to Building CCB. Interestingly, methylene chloride was detected in building CCB above the target indoor air concentration. Ideally, Solutia should attempt to collect soil vapor samples that could not be sampled due to saturated conditions in April 2003 in order to substantiate the conclusion that the presence of methylene chloride is from an indoor source rather than from soil vapor or groundwater. The need for sampling at these two locations was discussed at the August 18, 2003 meeting.

Response: A soil vapor sample was collected at SVP-7, next to building CCB, in August 2003. This soil vapor sample did not contain any methylene chloride in the soil vapor, demonstrating that the source of methylene chloride in the CCB building is not vapor intrusion from the groundwater.

The target depth for all of the soil vapor probes was 5 feet below grade, based on EPA comments on the Work Plan. At some locations, however, wet soils were noted at the target depth, so the probe depth was decreased to allow vapor sampling. Despite

installing probe SVP-13 to less than the target depth, water was still present in the probe on the date of soil vapor sampling in April. In August, probes SVP-7 and SVP-13 were replaced with shallower probes (SVP-7A and SVP-13A, respectively). Water was also present in probe SVP-17, so this probe was also reinstalled to a shallower depth (SVP-17A). All three of these locations subsequently yielded soil vapor samples in August 2003.

7. Section 3.1, In Plant Soil Vapor Sampling, Page 3-2

It should be noted in Table 3-1 that benzene concentrations in soil vapor at sample point 14 exceed the OSHA PEL by 10%.

Response: Although the benzene concentration from the sample at SVP-14 does exceed the OSHA PEL, it is noted that the probe was drilled through asphalt, which acts as a barrier to the release of soil vapors and also acts to trap soil vapors leading to higher concentrations. Table 3-1 merely reports the data and does not specifically highlight any data points.

8. Section 5.0, Conclusions, Page 5-1

The first bullet discusses the occurrence of MIBK in Building BBZ and concludes that the analytical results for the soil vapor sample (SVP-16) collected adjacent to Building BBZ supports the conclusion that soil vapor is not the primary source of VOCs detected in the indoor air. As discussed in the previous comments, this conclusion may not be completely accurate and should be revised to address the possibility that the MIBK in indoor air may have been the result of subsurface vapor intrusion, given that MIBK was detected in both soil vapor samples and indoor air samples.

Response: Refer to the response to Comment 3.

9. Attachment A

This attachment provides the soil vapor probe installation and sampling protocols and the soil vapor sampling field forms. In addition, there is a soil gas sampling point construction summary. As our original comments indicated, the soil vapor samples should be collected at a minimum depth of 5 feet below ground surface (bgs). However, Table 1 in Attachment A indicates that one sample SVP-06 had a total depth of 12 feet and the depth interval of the implant was from 11.5 to 12 feet bgs. It is noted that the depth interval for all other implants ranged from 4.25 to 6.5 feet bgs. There is no discussion in the text regarding the reason why this soil vapor location was deeper than the other soil vapor samples. Please provide a discussion of the rationale for extending the depth for SVP-06 and discuss what, if any, impact this will have on your evaluation of the soil vapor sampling results.

In addition, it is noted that the depth interval of the implant for soil vapor sampling locations SVP-09, SVP-13, SVP-16, and SVP-17 are less than the minimum depth of 5

feet bgs requested by EPA in previous comments. Please provide a discussion of the reasons for installing the implant at a depth of less than 5 feet bgs. Also, please discuss what, if any, impact this will have on the soil vapor sampling results.

Response: The soil vapor sample SVP-6 was constructed to 12 feet below grade, as requested by EPA, because it is immediately adjacent to the BK Administration Building, which has a basement. This was an attempt to evaluate soil vapor at the potential point of entry into the basement of the BK Building. The other three buildings are at grade and, thus, all other sample intervals were at depths between 4.25 and 6 feet bgs.

Four samples (SVP-9, SVP-13, SVP-16 and SPV-17) were not constructed deeper than 5 feet below grade either because water was encountered at shallower depths, or a clay layer was encountered at a shallower depth.

The revised sampling point construction summary is shown in Table 3-1 of the report.

10. Attachment C

Several issues in the receiving notes for several of the sample shipments raise concerns regarding the integrity of the samples and accuracy of the analyses. Instances were identified where samples were mislabeled and did not match chain of custody logs, the VOST XAD tube samples were not wrapped in aluminum foil and therefore came in contact with plastic shipping bags, temperatures of samples were not maintained within 4 degrees Celsius +/- 2 degrees, and the CCB-office sample was analyzed 19 minutes past the 72-hour holding time. Section 4.0 Data Quality Issues mentions the sample preservation and exceedance of holding time, but does not discuss the other issues. On page 4-2, the report states, "consequently, although these deficiencies are noted, it appears unlikely that they compromised data quality." From a quality assurance perspective, it is unacceptable to arrive at this conclusion without performing an independent data validation, which does not appear to have been performed.

According to the December 12, 2002, Field Sampling Plan for the Human Health Environmental Indicators Air Investigation, a third party data validator was identified. It does not appear that the laboratory data have been validated by a third part validator. Third party data evaluation needs to be performed for both rounds of sampling.

Response: The data are being validated by an independent third-party. Ten percent of the samples will be subject to full validation (Level 4), while the remainder of the data will be validated using routine data validation procedures. As soon as the validation is complete, the validated data will be submitted.